

The §103(a) Rejection:

Claims 1-5, 8, 9, 12, 18, and 19 have been rejected under 35 U.S.C. §103(a) as being obvious over Molinier et al., U.S. Pat. No. 7,189,375 (Molinier) in view of Moyer et al., U.S. Pat. No. 5,198,007 (Moyer).

The Office Action avers that Molinier describes three layers. In support of this the Office Action states:

Re claims 1 and 8 as shown Figures 3-4, Molinier et al. disclose an improved Diesel exhaust filter (10) comprising a rigid porous wall (12), the porous wall having a first side (inlet channel side) and a second side (outlet channel side), the filter having three layers, [t]he first layer being adjacent the first side of the rigid porous wall, the first layer comprising a Diesel oxidation catalyst (22), the third layer being adjacent the second side of the rigid porous wall, the third layer comprising a three way catalyst (a catalytic metal component of a NOx adsorber composition (24) is deposited on a washcoat (lines 29-31 of column 8))), the second layer (wall portion (12) and the washcoat) being between the first layer and third layer, the second layer comprising a nitrogen oxide adsorber (alkali metal or alkaline earth metal (line 65 of column 7 to line 6 of column 8)).

Applicants disagree. Molinier only teaches two catalyst layers. Applicants find no place in Molinier supporting the contention of three layers of catalyst. In particular, there is no support for such a contention in the cited sections of Molinier.

Applicants point out, at line 65 of column 7 to line 6 of column 8, Molinier states, “ [i]n addition to the catalytic metal component, the *porous support* may be further loaded with one or more NOx trapping materials, such as alkali metals, alkaline earth metal, and mixtures” Applicants, conjecture that perhaps the Office Action is suggesting that the porous support is referring to the filter element 12. This sentence, however, upon inspection is referring to the “NOx adsorber composition 24 preferably comprises a *washcoat* comprising a *porous support*, a catalytic metal component and one or more trapping materials (such as *alkali metals* . . .) disposed thereon.” (col. 7, lines 8-13, emphasis added) The porous support is

described at col. 7, lines 17-21. The porous support, washcoat and alkali metals are merely a part of the NOx absorber composition and as such is not another layer.

Applicants also point out that Molinier describes that the NOx absorber composition and the soot oxidation catalyst may be disposed on the surface the filter elements 12 and/or impregnated into the filter elements 12 (col. 2, lines 17-20 and 29-31). From Figures 1, 3 and 4, the filter element is obviously, for example, a porous wall in a ceramic honeycomb filter. Thus, Molinier makes a clear distinction of catalyst disposed on the surface and catalyst within the filter element 12 (i.e., porous filter wall). The filter element may be cordierite or mullite (col. 7, line 1). This is not surprising, since Molinier is quite concerned about the thickness of layers and concern with pressure drop caused by layers (col. 4, lines 38-40 and col. 5, lines 18-21).

The only places where Molinier may actually describe layers is, col. 4, lines 26-40 and, second, col. 5, lines 9-17. In the first passage, a soot catalyst is disposed on the surface of the filter element that forms the inlet channel, with it being preferred that the NOx absorber composition being disposed on the surface of the filter element that forms the outlet channel. At this passage, Molinier also describes that the NOx absorber composition may also be disposed on the surface of the filter element that forms the inlet channel, but does not specifically describe discreet layers of the soot catalyst and NOx absorber composition on the surface of the filter element forming the inlet channel. Thus, from this passage, Molinier reasonably describes a layer of soot catalyst on the surface of the filter element that forms the inlet channel and a NOx absorber composition on the surface of the filter element forming the outlet channel.

In the second passage, discreet layers of these two catalysts (i.e., the soot combustion catalyst and NOx absorber composition) on the surface of the filter element that forms the inlet channel is described. These catalysts may be disposed on the surface of the filter element forming the inlet channel as layers and the order of the layers of these catalysts may be varied. Thus, from this passage, Molinier reasonably describes soot catalyst and NOx absorber composition layers on the surface of the filter element that forms the inlet channel. No other layers are explicitly described by Molinier.

Because of the “and/or” regarding impregnating into the filter wall as opposed to disposing on to the surface of the filter wall each of the catalysts (NOx absorber and soot catalyst), Molinier, implicitly, from Claim 1, may describe either soot catalyst on either surface of the filter element and the NOx absorber composition impregnated in the filter element or vice-versa. Molinier, however does not describe or suggest catalyst layers within the filter element (i.e., filter wall) in any way.

Amended Claim 1:

To summarize, amended Claim 1 requires that the soot catalyst and NOx absorber are layers that are in the porous wall of a filter and the porous wall is an acicular ceramic. As described above, Molinier fails to describe or suggest separate and distinct catalyst layers within the filter wall. Thus, from the reading of Molinier, can be attributed to the pressure drop problem recognized by Molinier described above, where the catalyst and NOx absorber compositions are preferred to be only disposed on the surface of the filter element, but even then the thickness of the layer has to be limited (e.g., col. 4, lines 26-39). In other words, if the pores of the filter element wall are filled with the catalyst, this would be akin to having a really thick catalyst layer on the surface of the filter element resulting in problematic pressure drop. Consequently, since amended Claim 1 requires that the catalyst layers are within the filter wall only in contradiction to the suggestion of Molinier, amended Claim 1 is non-obvious over Molinier in view of Moyer (note, Moyer was merely cited to show that acicular mullite may be used as a filter).

Further, Molinier makes no distinction as to the usefulness of any particular material of the filter element. Molinier only describes a long list of suitable materials such as cordierite, silicon carbide and mullite (col. 6, line 67 and col. 7, lines 1-4). In contrast, amended Claim 1 requires the use of an acicular ceramic, none of which is described by Molinier. Surprisingly, the use of such acicular ceramics have been discovered to allow for the use of the catalyst in the walls with sufficient catalyst without the problem of pressure drop (see, for example, page 5, lines 25-31 and paragraph bridging pages 6 and 7 of the specification wherein the filter can have a large amount NOx absorber in the walls - 10% by volume -, which is much greater than described by Molinier). This is surprising, since Molinier and Moyer fail to

describe any difference the material of the filter wall has on performance of the filter (e.g., pressure drop) with a catalyst in the filter wall or even without a catalyst at all. In other words, they make no distinction between filter wall materials and certainly do not lead one to expect substantially improved performance by use of an acicular ceramic with catalyst layers in the wall. For this further reason, amended Claim 1 is non-obvious over Molinier in view of Moyer.

Amended Claim 6:

To summarize, amended Claim 6 requires that a filter in which the wall of the filter is an acicular ceramic and within the porous wall is a catalyst composition comprised of a NO_x absorbent and a soot combustion catalyst, wherein the NO_x absorbent is comprised of a barium salt, barium oxide or combination thereof and said NO_x absorbent is present from 40 grams/liter to 570 grams/liter.

As described above, Molinier specifically describes that pressure drop in the filter is a problem. In particular, Molinier prefers that the catalysts are on the surface of the filter to mitigate this problem as described above. Molinier only describes catalyst loadings of at most about 0.031grams/cc (31 grams/liter) of a filter (col. 10, lines 58-60). Amended Claim 1, in contrast, requires that just the NO_x absorbent is substantially greater than the amount of catalyst described by Molinier. This ability to put a great amount of catalyst/NO_x absorbent within the porous filter wall is neither described nor suggested by Molinier or Moyer individually or in combination. Further, Molinier makes no distinction in the filter element (i.e., porous filter wall) and as such, a filter with a high NO_x absorbent loading within the porous acicular ceramic filter wall is unexpected. For this reason, amended Claim 6 is novel, non-obvious and patentable.

Amended Claim 8:

To summarize, amended Claim 8 is a filter where the porous filter wall of the filter is an acicular ceramic and the filter has three layers of different catalysts compositions: soot catalyst, NO_x absorber and three catalysts, wherein at least a portion of the NO_x absorber is within the porous wall. As described above, Molinier fails to describe layers of any catalysts within the wall. Molinier also fails to describe

anything other than two layers of differing catalyst compositions. Since, Molinier neither describes layers within the porous wall of the filter nor more than two differing catalyst composition layers, Molinier in combination does not describe the elements of amended Claim 8. That is, Molinier and Moyer do not describe or suggest each of the elements of amended Claim 8. Since, all of the elements of Claim 8 (three differing catalyst layers wherein at least a portion of one layer is within the porous wall), Claim 8 is novel and non-obvious over Molinier in view of Moyer.

Response to Arguments

The Examiner in Response to Arguments' section of the Final Rejection, the Examiner quotes Molinier at lines 29-37 of col. 8, which reads:

The catalytic metal component and trapping materials can then be deposited on or with the washcoat by any suitable manner, such as by impregnation techniques. For example, the catalytic metal component and trapping materials, individually or together, can be dissolved as soluble precursors (e.g., as a salt like potassium nitrate) in an aqueous or organic solvent, which is then impregnated into the porous support. Preferably, the catalytic metal components are impregnated prior to the trapping materials. (emphasis added by Examiner).

Applicants agree that Molinier teach impregnating a **washcoat**, and there may even be a layer of differing materials on or within a washcoat particle. This, however, does not lead to a layer of any sort within the wall or on the wall of the honeycomb filter. It merely, distributes such materials on the washcoat, in which the catalyst on the washcoat is evenly distributed on or within the walls of the honeycomb support. "Washcoat" is a term of the art meaning, for example, high surface area particulates of alumina and zeolite (see col. 7, lines 18-34). These particles are washcoated on or in the walls of a metal or ceramic honeycomb wherein the catalyst is applied on the washcoat particles (see, for example, U.S. Pat. No. 4,233,189 abstract). Thus, it is clear that Molinier does not describe discreet layers of differing catalyst on or within

the honeycomb support walls. For this reason, Claims 1-5, 8, 9, 12, 18 and 19 are non-obvious.

Considering the above Claims 1-5, 8, 9, 12, 18, and 19 are patentable. Applicants, therefore, respectfully request withdrawal of all rejections and allowance of Claims 1-5, 8, 9, 12, 18, and 19.

Respectfully submitted,

Electronic signature:/Kevin J. Nilsen/

Kevin J. Nilsen
Registration No. 41,510
Phone: 248-391-6321

P. O. Box 1967
Midland, MI 48641-1967
KJN/mfm